

4.2.5. Slew Rates

4.2.5.1. Purpose

The purpose of this test is to determine the vertical and horizontal maximum slew rates of the FLIR and to evaluate the effects these rates have upon the utility of the FLIR for quickly pointing to the direction of a target and then maintaining an orientation towards the target as the host aircraft maneuvers or flies in close proximity to the target.

4.2.5.2. General

The FLIR slew rates are important for three reasons. First, the operator will want to rapidly point the FLIR in the direction of targets of opportunity or towards objects that catch his or her attention. Next, as the aircraft maneuvers towards its maximum limits, the angles from the fuselage reference line to the target may change rapidly. The FLIR will have to slew rapidly to keep up with the aircraft rates. Finally, as the aircraft approaches the target, the angles from the fuselage reference line to the target will have to eventually change, unless the pilot flies a collision course to the target. Many types of ordnance require targeting data even as the aircraft passes the target and leaves the area. Even for unguided ordnance, the operator may want to continue viewing the target after an overflight to assess the damage. For a given aircraft groundspeed, the closer the aircraft passes to the target, the higher the slew rates that will be required to keep the FLIR aligned onto the target.

4.2.5.3. Instrumentation

A stop watch and data cards are required for this test. A voice recorder is optional.

4.2.5.4. Data Required

Record the time for the FLIR turret to slew from full left to full right and full right to full left. Record the time to slew from full up to full down and full down to full up. List qualitative comments concerning the utility of the FLIR for quickly slewing from a target near one slew angular limit to the opposite slew angular limit. Make comments concerning the utility of the slew rate limits as the aircraft performs evasive maneuvers within the aircraft angular slew limits for maintaining alignment with the

target. Record comments concerning the utility of the slew rate limits as the aircraft flies over the target at mission relatable weapons release altitudes and performs post release maneuvers, for maintaining the FLIR alignment with the target.

4.2.5.5. Procedure

Measure the slew angular limits as described earlier. While on the ground, slew the FLIR to a full left angular limit. Slew to a full right angular limit as quickly as possible using the stop watch to measure the time. Repeat in the opposite direction. Slew the FLIR to the full down position and measure the time required to slew to a full up position. Repeat for a full up to a full down position. Close coordination will be required between the operator and an assistant if the operator is unable to accurately observe the FLIR pod slew.

During mission relatable attacks, perform evasive maneuvers inbound to the target. Evaluate the utility of the FLIR slew rates for maintaining orientation over the target position. Attempt the test first in a geostable mode and if problems are noted repeat in a manual fuselage referenced mode. Overfly the target at a mission relatable minimum altitude for weapons delivery and then perform mission relatable post-flight maneuvers. Evaluate the utility of the FLIR slew rates for maintaining alignment with the target for post-release weapons guidance and post-attack damage assessment. Perform the test first in a geostable mode and if problems are noted perform the test in a fuselage referenced manual mode. Repeat the attack using different attack modes as time allows.

4.2.5.6. Data Analysis and Presentation

Divide the horizontal slew angular limits by the number of seconds required to slew from left to right and from right to left to get the slew rate in degrees per second. The two measurements should be fairly close or a problem in the slewing mechanization may be indicated. Repeat for the upper and lower angles. There might be a slight difference in these two rates due to the effects of gravity, depending upon the slewing mechanism. Note that these are average slew rates and may vary at different points during slewing; however, in most situations where large slew rates are operationally required,

large angular changes are also required and the average time found here is mission relatable. Relate the effects of the slew rate to the requirement to quickly slew to a target of opportunity that catches the operator's eye in time to set up an attack. Relate the slew rates to the requirement to keep the FLIR aligned on the target during ingress evasive maneuvers and while passing the target for post-release weapons guidance and damage assessment. If problems are not noted during the geostable attacks, the slew rates are adequate; however, if problems are noted, the test must be repeated in the fuselage referenced mode to insure the noted drifts are not a result of the geostable mode implementation.

4.2.5.7. Data Cards

Sample data cards are presented as card 61.

CARD NUMBER _____

SLEW RATES (GROUND TEST)

[FOLLOWING THE SLEW ANGULAR LIMITS TEST, MEASURE THE TIME REQUIRED TO SLEW FULL LEFT TO RIGHT AND FULL RIGHT TO LEFT. MEASURE THE TIME TO SLEW FULL UP TO DOWN AND FULL DOWN TO UP.]

LEFT TO RIGHT _____ SEC

RIGHT TO LEFT _____ SEC

UP TO DOWN _____ SEC

DOWN TO UP _____ SEC

CARD NUMBER _____ TIME _____ PRIORITY L/M/H

SLEW RATES (AIRBORNE TEST)

[DESCEND TO _____ FEET AGL AND SET MACH=____. ACQUIRE THE _____ TARGET AND HEAD INBOUND SELECTING THE NFOV, GEOSTABLE MODE. PERFORM MISSION RELATABLE JINKING INBOUND AND THEN PERFORM A _____ DELIVERY WITH POST-DELIVERY EVASIVE MANEUVERS. NOTE IF THE FLIR REMAINS ALIGNED OVER THE TARGET TO THE SLEW ANGULAR LIMITS. IF PROBLEMS ARE NOTED, REPEAT IN A FUSELAGE REFERENCED MODE AND PROVIDE MANUAL UPDATES.]

TYPE DELIVERY _____

POINT IN THE DELIVERY WHERE THE DRIFT OCCURRED:

DESCRIBE THE MANEUVER:

AIRSPEED _____

APPROXIMATE RANGE FROM TARGET _____

TYPE DELIVERY _____

POINT IN THE DELIVERY WHERE THE DRIFT OCCURRED:

DESCRIBE THE MANEUVER:

AIRSPEED _____

APPROXIMATE RANGE FROM TARGET _____